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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/630,613	07/30/2003	Ming Zheng	CL2191US NA	3957

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E I DU PONT DE NEMOURS AND COMPANY
LEGAL PATENT RECORDS CENTER
BARLEY MILL PLAZA 25/1122B
4417 LANCASTER PIKE
WILMINGTON, DE 19805

EXAMINER	
FORMAN, BETTY J	
ART UNIT	**PAPER NUMBER**
1634	

NOTIFICATION DATE	DELIVERY MODE
04/24/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PTO-Legal.PRC@usa.dupont.com

Office Action Summary	Application No.	Applicant(s)	
	10/630,613	ZHENG ET AL.	
	Examiner	Art Unit	
	BJ Forman	1634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 February 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21 and 25-31* is/are pending in the application.

4a) Of the above claim(s) *1-19* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *20,21 and 25-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

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DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12 February 2008 has been entered.

Status of the Claims

2. This action is in response to papers filed 12 February 2008 in which claims 20 and 26 were amended and the previous rejections were traversed. The amendments have been thoroughly reviewed and entered. Applicant's arguments have been thoroughly reviewed and are discussed below.

The previous rejections in the Office Action dated 1 October 2007 are withdrawn in view of the new grounds of rejection discussed below.

Claims 20-21 and 25-31 are under prosecution.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 30-31 rejected under 35 U.S.C. 102(b) as being anticipated by Ulmer (U.S. Patent No. 5,674,743, issued 7 October 1997).

Regarding Claim 30, Ulmer discloses a geometric nanostructure comprising two nanoparticle-ligand complexes spatially arranged in an ordered geometric pattern (i.e. linear

between two optical traps, Fig. 14), the complexes comprising a nanoparticle and a single stranded DNA ligand (Column 25, lines 23-45) wherein the ligand has a proximal portion attached to the nanoparticle and a distal portion wherein the complexes are each affixed to each other through the distal portions (Column 23, lines 1-56 and Fig. 14). Ulmer also teaches assembly of the dimers via sequence-specific interaction of the particles (Column 25, lines 23-45) and further teaches the nanoparticles are metallic i.e. magnetic, Column 25, lines 23-30).

Regarding Claim 31, Ulmer discloses the nanoparticles are about 10nm in diameter (Column 23, line 62).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 20-21 and 25-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Alivisatos et al (Nature, 1996, 382: 609-611) in view of Niemeyer et al (Chembiochem, 2001, 2: 2609264)

Regarding Claims 20, 28-29 and 30, Alivisatos et al teach a dimer or trimer nanostructure comprising at least three complexes spatially arranged in an ordered geometric pattern (Fig. 1), the complexes comprising a nanoparticle and a single stranded DNA ligand (Column 7, lines 24-35) wherein the ligand has a proximal portion attached to the nanoparticle and a distal portion wherein the complexes are formed through the distal portions of the DNA

ligands (page 610). Alivisatos et al further teach the DNA ligands are coupled with a 10-fold excess nanoparticles to obtain desired stoichiometries of oligonucleotide and Au cluster (page 610, right column) and illustrate single DNA/particle (Fig. 1-2). Alivisatos et al also teaches that nanocrystals coupled with "a single-stranded DNA" makes it possible to self-assemble the nanocrystal molecules into two and three-dimensional complexes (page 610, left column). This clearly suggests a single, single-stranded DNA molecule/particle is desired and obtainable.

However, single molecules assemblies using single molecule-particle complexes were known in the art at the time the claimed invention was made as taught by Niemeyer. Niemeyer teaches the complex comprises a biotin/avidin "particle" (Fig. 1). Niemeyer teaches that complex formed by attaching single, single DNA-molecules to the particle are useful tools for building nanostructure networks because of the DNA properties of specificity for complementary sequences, physiochemical stability, mechanical rigidity and high-precision processibility (page 260, first paragraph). Niemeyer further teaches that the single DNA molecule permits controlled construction of "well-defined building blocks" for construction of larger nanostructures as desired in the art (page 263, paragraph spanning left-right columns).

It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to apply the single-DNA molecule-to-particle complex of Niemeyer to the DNA molecule complex of Alivisatos et al. Alivisatos is specifically interested in constructing nanoscale structures using DNA molecules attached to particles and illustrates the particles having a single copy of the DNA molecule (Fig. 1). Niemeyer teaches that use of single DNA molecules allows for controlled construction of "well-defined building blocks" for constructing nanostructures. Therefore, one of ordinary skill in the art would have been motivated with a reasonable expectation of success to combine the teaching of Niemeyer and Alivisatos to obtain the claimed invention for the benefit of providing the well-defined building blocks for nanostructures as desired in the art (Niemeyer, page 263, paragraph spanning left-right columns).

Regarding Claims 21 and 31, Alivisatos et al teach the particles have a diameter of "about" 2 nm (page 610, right column).

Regarding Claim 25-26, Alivisatos et al teach the oligonucleotides are derivatized with a thiol group (page 610).

Regarding Claim 27, Alivisatos et al teach the nanostructure wherein the DNA ligands form complexes by hybridization (Fig. 1).

7. Claims 20-21 and 25-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kelley et al (U.S. Patent No. 6,958,216, filed 9 January 2002) in view of Niemeyer et al (Chembiochem, 2001, 2: 2609264).

Regarding Claims 20, 28-29 and 30, Kelley et al disclose a geometric nanostructure comprising at least three complexes spatially arranged in an ordered geometric pattern (Fig. 13), the complexes comprising a nanoparticle and a single stranded DNA ligand (Column 7, lines 24-35) wherein the ligand has a proximal portion attached to the nanoparticle and a distal portion wherein the complexes are each affixed to each other through the distal portions (Column 7, lines 24-35 and Example 6, Column 16, lines 25-52). Kelley et al teach controlled assembly of the dimer or timer nanostructure via sequence-specific interaction of the particles (Column 16, lines 39-44) and further teach the controlled density of DNA molecules on the beads to produce DNA wires (Column 7, lines 24-50) but they do not specifically teach a single DNA molecule on the beads.

However, single molecule assemblies using single molecule-particle complexes were known in the art at the time the claimed invention was made as taught by Niemeyer. Niemeyer teaches the complex comprises a biotin/avidin "particle" (Fig. 1). Niemeyer teaches that complex formed by attaching single, single DNA-molecules to the particle are useful tools

for building nanostructured networks because of the DNA properties of specificity for complementary sequences, physiochemical stability, mechanical rigidity and high-precision processibility (page 260, first paragraph). Niemeyer further teaches that the single DNA molecule permits controlled construction of "well-defined building blocks" for construction of larger nanostructures as desired in the art (page 263, paragraph spanning left-right columns).

It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to apply the single-DNA molecule-to-particle complex of Niemeyer to the DNA molecule complex of Kelley et al who is specifically interested in constructing nanoscale structures using DNA molecules attached to particles and illustrates the particles having a single copy of the DNA molecule (Fig. 13). Niemeyer teaches that use of single DNA molecules allows for controlled construction of "well-defined building blocks" for constructing nanostructures. Therefore, one of ordinary skill in the art would have been motivated with a reasonable expectation of success to combine the teaching of Niemeyer and Kelley to obtain the claimed invention for the benefit of providing the well-defined building blocks for nanostructures as desired in the art (Niemeyer, page 263, paragraph spanning left-right columns).

Regarding Claims 21 and 31, Kelley et al disclose the nanoparticle having a diameter of 2 to 10 nm (Column 13, lines 53-55). Alivisatos et al teach the particles have a diameter of "about" 2 nm (page 610, right column).

Regarding Claim 25-26, Kelley et al disclose the nanostructure wherein the ligand is derivatized with a thiol group at the distal end (Example 3). Alivisatos et al teach the oligonucleotides are derivatized with a thiol group (page 610).

Regarding Claim 27, Kelley et al disclose the nanostructure wherein the DNA ligands form complexes by hybridization of distal portions of the nucleic acid (Fig. 135). Alivisatos et al teach the nanostructure wherein the DNA ligands form complexes by hybridization (Fig. 1).

Response to Arguments

8. Applicant asserts that both Kelley and Alivisatos require complementation of double stranded DNA to form the complexes while the instant claims do not have such a requirement. The assertion is noted. However, the claims as written encompass the double strand formation as taught by the cited references. Therefore, the argument is not commensurate in scope with the claims.

Applicant further argues that neither of the references teaches of each nanoparticle-ligand complex is affixed to each other through distal portions. The assertion is noted, but is not found convincing because the term "affixed" is given its broadest reasonable interpretation to encompass the hybridization between distal portions of DNA molecules attached to the particles. Hence, both references teach the structures as broadly claimed.

Conclusion

9. No claim is allowed.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to BJ Forman whose telephone number is (571) 272-0741. The examiner can normally be reached on 6:00 TO 3:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ram Shukla can be reached on (571) 272-0735. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BJ Forman
Primary Examiner
Art Unit 1634

/BJ Forman/
Primary Examiner, Art Unit 1634